What is claimed is:

1. A coherent receiver operable for use in an underwater telemetry system, comprising:

at least one data input channel connected to said coherent receiver;

a decision feedback equalizer for receiving said at least one data input channel and producing a single stream of pre-processed data at a decision feedback equalizer output; and

a turbo-equalizer connected to said feedback equalizer output for receiving said single stream of pre-processed data.

2. The coherent receiver of claim 1 further comprising:

a training symbol sequence generator; and

a correlator in communication with said training symbol sequence generator and said decision feedback equalizer, an output of said correlator being receivable by said turbo-equalizer.

3. The coherent receiver of claim 1 wherein said turbo equalizer-further comprises an equalizer portion and a decoder portion interconnected for iterative operation.

4. The coherent receiver of claim 3 wherein said equalizer portion and said decoder portion each utilize a MAP algorithm.

5. The coherent receiver of claim 1 further comprising a plurality of receiver transducers for producing spatially diverse data for said at least one input channel.

6. The coherent receiver of claim 1 further comprising a single receiver transducer for producing time diverse data for said at least one input channel.

7. The coherent receiver of claim 6 wherein said single receiver transducer includes a plurality of input channels and said decision feedback equalizer is operable for selectively controlling a total number of said input channels utilized by said decision feedback equalizer based on error analysis of said time diverse data.

8. A method for operation of a coherent telemetry system, said method comprising:

detecting a received signal comprising a plurality of data channels;

pre-processing said plurality of data channels within a decision feedback equalizer to produce a single output data stream from said plurality of data channels; and

post-processing said single output data stream within a single channel turbo-equalizer.

9. The method of claim 8 wherein said post-processing of said single output data stream further comprises iteratively equalizing and decoding data from said single output data stream to produce a corrected data output stream.

10. The method of claim 9 further comprising utilizing a MAP algorithm for said steps of iteratively equalizing and decoding.

11. The method of claim 8 further comprising mitigating phase jitter in said single output data stream utilizing said decision feedback equalizer.

12. The method of claim 8 further comprising:

providing that said received signal further comprises a transmitted training symbol sequence;

pre-processing said transmitted training symbol sequence to provide a pre-processed training sequence;

producing a local training symbol sequence within said receiver;

correlating said local training symbol sequence with said pre-processed training sequence to provide a channel estimate; and

utilizing said channel estimate within said turbo-equalizer.

13. The method of claim 8 further comprising providing that said received data further comprises time diversity data.

14. The method of claim 8 further comprising providing that said received data further comprises spatial diversity data.